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NOTES FROM PACIFIC COAST OBSERVATORIES

The Ring Nebula B. D. +30° 3639

Since Campbell first discovered that the B. D. star +30° 3639 was enveloped in nebulosity, little has been said regarding the disk itself, altho much work has been done on its spectrum. With the large scale (1606 inches focal length) of the Cassegrain focus of the 100-inch reflector available, a number of direct photographs were taken, together with some slitless spectrograms, with focal-plane spectrograph III having camera and collimator of about 6 inches focus.

The data are as follows:

a 1919, Aug. 17, Direct, 45^m. Cramer Iso. Image elongated.
b 1919, Aug. 17, Direct, 5^m and 10^m. Bathed Seed 23 3 dye. Image small and nearly round.
c 1919, Aug. 17, Direct, 5^s, 15^s, 45^s, 135^s, and 8^m. Wratten M. Image elongated.
d 1919, Aug. 22, Slitless spectrogram. Iso. 1^h. Fair image.
e 1919, Aug. 26, Slitless spectrogram. Bathed Seed 23 3 dye. 2^h. Good image.
f 1919, Sept. 28, Slitless spectrogram. Iso. 2^h. Image large.

The 45-minute plate *a* is over-exposed, but shows an almost uniform disk, approximately round, save that there is a portion lacking in the Nf quadrant.

The 5-minute and 10-minute plate *b* shows the central star surrounded by a non-uniform disk having greatest intensity at several points around the periphery, notably a point a little preceding North and the whole Sf quadrant. This plate shows well the break in the Nf quadrant.

Plate *c* was taken to show the formation nearer the star and confirms everything on plate *b*.

The one-hour slitless spectrogram *d* is extremely interesting, as $H\beta$, $H\gamma$, and $H\delta$, traces of $H\epsilon$, and 3727 are rings repeating the general form of the direct photograph to a greater or less extent.[1]

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[1] Observations made by Mr. Wright with a slitless spectrograph in September, 1916, show this object to be a ring nebula. It is described as follows in *Lick Observatory Publications*, **13**, 221 the printing of which has been delayed by war conditions, but which is now in press:

"An excellent plate secured with the slitless spectrograph shows that the envelope, or nebula, is not a disc, but an exceedingly minute ring, irregularly elliptical in shape and somewhat eccentrically placed with respect to the bright star. The axes of the $H\beta$ ring, in the sense mean of inner and outer diameters, are about 2″ and 3″ respectively. The spectrogram in question probably represents the limit of definition obtainable with this apparatus. It is reproduced in plate L, magnified about seventeen diameters from the original negative. The outer diameter of the image as measured on this plate is about 5″. An increase in exposure extends the borders slightly."

Mr. Wright's observations were made with the Crossley reflector and as the pictures are only an eighth of the size of those secured at Mt. Wilson the amount of detail is less.—Editor.

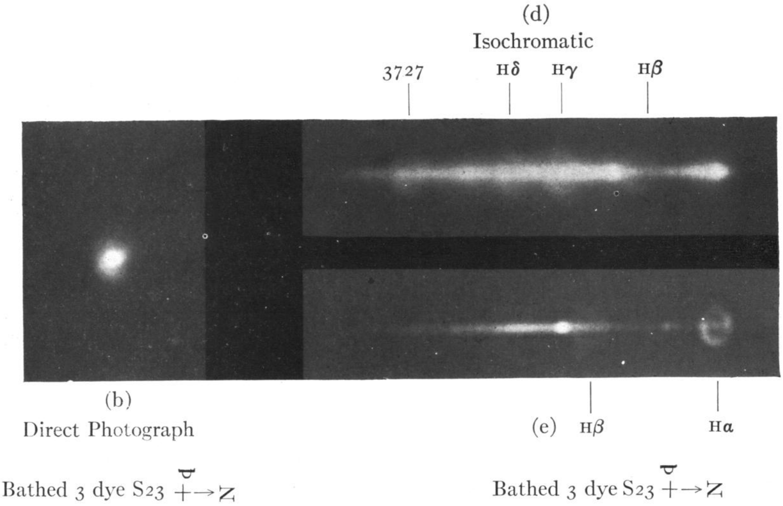

FIG. 1. The Ring Nebula B. D. + 30° 3639

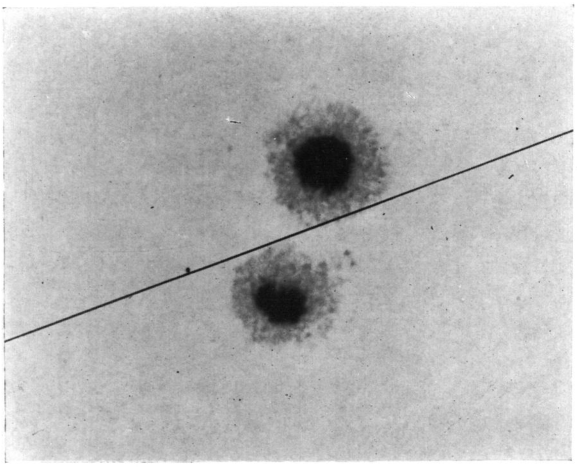

FIG. 2. Spots close to the Sun's Equator, September 13, 1919

PLATE X.

The two-hour slitless spectrogram *e* shows the Hα (group) and Hβ as rings in which the Np and Sf quadrants are stronger, as on the direct photographs.

The two-hour spectrogram *f* confirms everything on plate *d*.

FRANCIS G. PEASE.

Plates *a*, *d* and *e* are reproduced in Figure 1 of Plate X.

TWO SUN-SPOTS CLOSE TO THE SUN'S EQUATOR

During the last rotation of the Sun two spots have been present which were very unusual because of their positions close to, but on opposite sides of, the Sun's equator. These groups appeared on the east limb of the Sun in the afternoon of August 12th. The north group, which was then 6° from the equator, was a well developed stream with a large leader. The south group was but 3° from the equator and, judging by its subsequent growth, had been born but a few hours earlier, most likely on August 11th or 12th.

As the Sun's rotation carried the groups across the disk two interesting things happened. The leading spot of the south group grew rapidly, its diameter increasing about 2000 miles per day for ten days. At the same time the leader of the north group, which was already over 30,000 miles in diameter, drifted south at the rate of 4500 miles per day. By August 23rd the edges of both spots had reached the equator, the south one by expansion and the north one by drifting.

During the time from August 13th to August 24th these two groups offered fine examples of the bipolar type. All the spots in the preceding part of the north group, including the large leader, were of the same magnetic polarity as the Earth's south magnetic pole, while the spots in the following half of the group were like the Earth's north magnetic pole. In the south group, just across the equator, the magnetic conditions were exactly reversed.

As the groups approached the west limb the following spots grew smaller, so that when they reappeared at the eastern limb on September 10th it was not surprising to find that the two preceding spots were all that was left of the groups. Their relative positions had not changed during the two weeks in which they were out of sight nor did they change during the following days. By September 15th they began to show signs of breaking up, in a very normal manner, however.